

Remarks

Acceptance and favorable action therefor of the present application in view of this responsive Amendment is respectfully requested. (An authorized Credit Card Payment Form, covering the fee amount for the extended period of time, is enclosed herewith.)

The format employed in this submission is consistent with the official USPTO test procedure regarding the submission of Amendments/Responses to certain Art Units including the Technology Center Art Unit in charge of the above-identified application. Information regarding this was received in a communication mailed, by the USPTO, December 20, 2002.

The status of the claims now pending are given hereinabove. Namely, claims 1, 2, 4-9, 11, 13 and 14 are currently being amended, and claims 33 and 34 are being newly presented. Original claims 3, 10 and 15-24 were previously withdrawn for purposes of examination. Also, claims 12 and 25-32 were earlier canceled.

An objection to the drawings was made under 37 CFR §1.83(a), as detailed in item 2, on page two of the outstanding Office Action. This objection involves the further limiting aspects covered by dependent claims 6 and 8 of the present invention. According to this objection, it is alleged that the featured aspect of "an air vent of the metal mold structure", according to claims 6 and 8, is not shown in the drawings. However, it is observed, from the description on page 27, lines 8-11 thereof, in the Substitute Specification, that the referred to embodiment is facilitated with an air vent (inherently) for purposes of relieving the cavity of air components of bubbles, the cavity being formed by the device hole 1a1 of the tape base 1a and the molding die 5, the molding die 5 being, for

example, a metal molding-die tool (page 18, line 16, of the Substitute Specification). Further, as discussed on page 39 of the Substitute Specification, any residual air remaining in the cavity "is externally exhausted through an air vent which is provided on the seal resin flow out side in the molding die 5" (See Figs. 3 and 8 of the drawings). The provision of an air vent which is provided on the seal resin flow out side in the metal molding die 5 permits uniform distribution of the seal resin as well as suppresses unwanted voids therein. It is submitted, such featured aspect as that referred to hereinabove, with regard to the noted expressions in dependent claims 6 and 8, is clearly supported by the original disclosure and is understood to be an inherent structural aspect, also, of the example embodiments. Therefore, since the referred-to featured aspect has been clearly shown to be adequately supported by the original disclosure, reconsideration and withdrawal of the standing objection to the drawings is respectfully requested.

Base claim 1 was further amended in consideration of further highlighting the particularities of the subject matter being covered including in a manner which is defining over the art documents of record. Specifically, base claim 1 was amended to add the provision of "... bump electrodes ... providing a connection with a printed circuit board, while ... through hole wirings" which are provided at both sides of the device hole provide "a connection with another device to be mounted on said tape carrier." This can be seen from the discussion in Figs. 15-25, although not limited thereto.

Claim 1, as now amended, further highlights, among other featured aspects thereof, the particularities of the "tape carrier" as one which has a base substrate (1a) and a plurality of lead portions formed on one surface of the base

substrate (see Figs. 2, 15, etc.). In accordance with the scheme, also, the base substrate has a device hole (1a1) and a plurality of through hole wirings (e.g., 6b), formed at both sides of the device hole (6a), extending from one surface to the opposing surface of the base substrate and are electrically connected to the plurality of lead portions (e.g., 1c). Further, the "semiconductor chip" is disposed in the device hole of the base substrate and the first ends of the plurality of lead portions are electrically connected to the plurality of external terminals of the chip, the first ends being located at the side of the chip bump electrodes (e.g., 2a). Also according to the present invention, as set forth in base claim 1, the "semiconductor chip" has the back surface thereof defined by spin-etching so that the semiconductor chip achieves a thickness which is thinner than that of the tape carrier. Also according to the defining aspects of the present invention, the "bump electrodes" provide connections with the printed circuit board, and the "through hole wirings," which are formed at both sides of the device hole, provide a connection with another device to be mounted on the tape carrier.

Featured aspects such as that discussed above are also provided with regard to newly added independent claim 33, although the latter calls for a "base wiring substrate" rather than calling for a "tape carrier having a base substrate ...". In accordance with the present invention, since the resulting semiconductor chip in the device is thinner and, also, has a smooth back surface, the semiconductor device has an anti-crackable structure with enhanced robustness (for the semiconductor chip sealed with the resin material) against any bending stress applied thereto (see page 22, lines 6-14, of the Substitute Specification). Further, since the device also features "bump electrodes" (e.g., 4) and "through hole wirings" (e.g., 6), which facilitate electrical connections on both sides of the

device, a highly thinned as well as a highly dense stacked package device can be realized. This is similarly the case in connection with a scheme such as that called for in newly presented independent claim 33.

According to the present invention, the thinness of the semiconductor chip also allows it to be disposed on a stress neutral plane as that called for in dependent claim 2, and, due to its reduced thickness, it permits it to be disposed within the device hole in a tape carrier and in a manner which allows a lead of the tape carrier to be electrically connected easily to an external terminal (e.g., Au bump electrode 2a in the drawings) of the chip. Such a semiconductor device scheme as that called for in base claim 1, and as that further defined in the dependent claims thereof as well as in connection with newly added independent claim 33 and corresponding dependent claim 34 thereof, not only could not have been realized from Haghiri-Tehrani et al's disclosure (US 4,460,825) but, moreover, could not have been suggested even over the combined teachings of Haghiri-Tehrani et al's ('825) and other ones of the cited references, as applied in the presently outstanding rejections.

Haghiri-Tehrani et al ('825) disclosed a carrier element for an integrated circuit module. However, Haghiri-Tehrani et al ('825), it is submitted, neither disclosed nor suggested a concept of thinning the back side of a semiconductor chip applied to device having a tape carrier structure in connection with realizing a semiconductor device having a thin structure and one that is an anti-crackable structure with enhanced robustness. Moreover, Haghiri-Tehrani et al ('825) also neither disclosed nor suggested a device structured so as to include "bump electrodes" and "through hole wirings" for providing connections at both sides of the device, the latter facilitating a connection with another device to be mounted

on the tape carrier (or stacked on the base wiring substrate), as presently called for in independent claim 1(33). A study of Figs. 4, 5 and 7, for example, in Haghiri-Tehrani et al ('825) is clearly supportive of this finding.

A careful review of the other references cited in the outstanding rejections would show, also, that the invention as presently called for in claims 1+ and 33+ could not have been achievable even in view of the combined teachings of Haghiri-Tehrani et al ('825) with any one of them, or, for that matter, even in view of all of their combined teachings. That is, Miyano et al (US 5,811,877), Kamiyama et al (US 5,422,163), Nakamura (US 5,729,051) and Ueda et al (US 5,196,917), both separately and combinedly, failed to teach the above technical concept of reducing the thickness as defined by spin-etching of the back surface of the chip in the manner which effects a thinning of the chip to a thickness which leads to an anti-crackable structure with enhanced robustness. Moreover, these references, either separately combined with Haghiri-Tehrani et al or jointly combined with Haghiri-Tehrani et al's teachings, also, would not have led one of ordinary skill to achieve such a structure and, moreover, one which also features "bump electrodes," in a manner as that presently called for, as well as "through hole wirings" which provide connections on both sides of the device so as to facilitate a stacking of another device on the tape carrier (base wiring substrate) as that presently called for.

A careful study of Miyano et al's stacked arrangement, for example, shows that the above-discussed featured aspects according to independent claims 1 and 33 including, also, the featured aspects directed to the bump electrodes as well as the through hole wirings are not taught therein. The example embodiments illustrated in Figs. 2, 6 and 7 in Nakamura also show that

they are clearly unlike the scheme present called for in claims 1+ and 33+. Ueda et al, it is submitted, is also deficient of a scheme as that called for in claims 1+ and 33+. That is, although Ueda et al taught a low-pressure transfer method of resin material into a cavity, Ueda et al's disclosure still did not overcome the deficiencies in Haghiri-Tehrani et al's disclosure, such as discussed above. Kamiyama et al's disclosure was cited for its alleged teachings of an air vent scheme in connection with the discharge of air/gasses in a cavity of a mold during formation of encapsulated injection. Kamiyama et al's teachings notwithstanding, the invention according to claims 1+ and 33+ would still not have been rendered obvious noting that Kamiyama et al also failed to overcome the deficiencies of Haghiri-Tehrani et al ('825), such as discussed above. It is submitted, the invention as that presently called for in claims 1+ and 33+ could not have been rendered obvious even over the combined teachings of Haghiri-Tehrani et al ('825) with the other cited references in the presently outstanding Office Action.

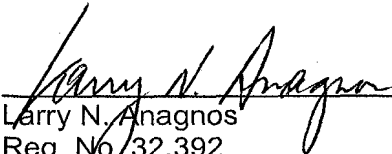
Regarding dependent claims 9, 13 and 14, the revisions made therein conform to the revised language in base claim 1. All other revisions are of a minor editorially formatting nature.

Therefore, in view of the Amendments present hereinabove, together with these accompanying remarks, reconsideration and favorable action therefor on claims 1, 2, 4-9, 11, 13, 14, 33 and 34 as well as an early formal Notification of Allowability of the above-identified application is respectfully requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees to the Deposit Account of

Antonelli, Terry, Stout & Kraus, LLP, Dep. Acct. No. 01-2135 (501.37120CX1),
and please credit any excess fees to such deposit account.

Respectfully submitted,
ANTONELLI, TERRY, STOUT & KRAUS, LLP



Larry N. Anagnos
Reg. No. 32,392

LNA/dks
703-312-6600